

Paediatric Laryngospasm

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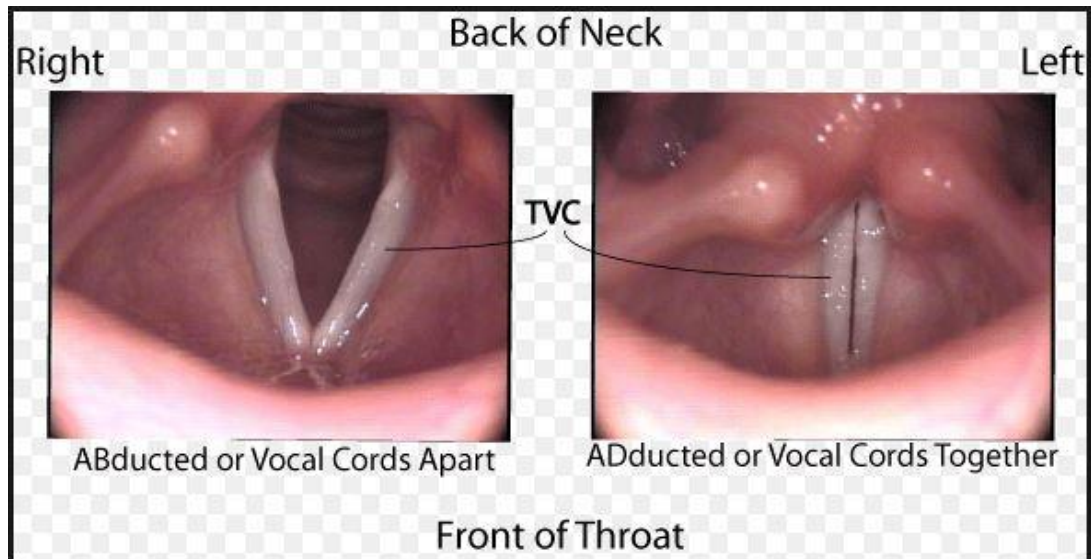




- **Anatomy & Physiology of the Larynx**
- **What is Laryngospasm?**
- **Risk Factors**
- **Identifying Laryngospasm, Management & Treatment**



I'm going to talk to you today about Paediatric Laryngospasm and hope you will find this presentation useful for your perioperative nursing practice.



The larynx, which we often call the voice box, is located at the top of the trachea, in front of the oesophagus, and is involved in breathing, producing sound, and protecting the trachea against irritants and foreign bodies. Here are pictures of an open and closed larynx. When we eat or drink the larynx automatically closes to protect our trachea against aspiration. This pictures shows an adult larynx. It is important to note in children the vocal chords are not as well developed and not as distinctive.



What is Laryngospasm?

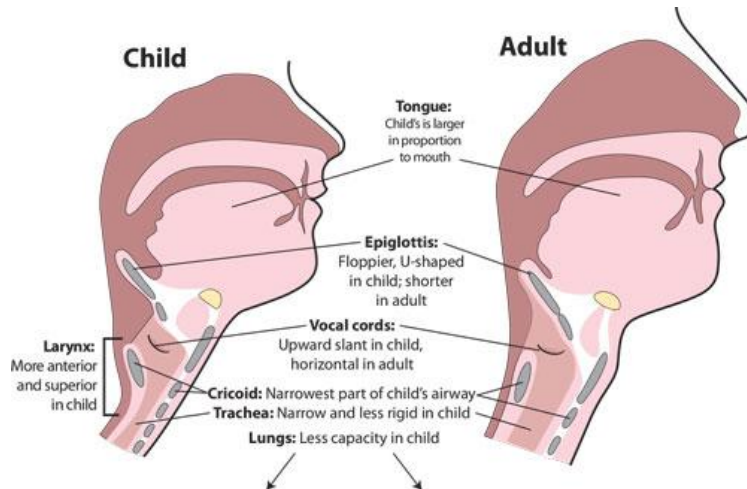
- Laryngospasm is an uncontrolled or involuntary contraction of the vocal chords resulting in a blocked airway.
- Laryngospasm is a medical emergency.
- Children are more at risk of Laryngospasm with estimates of up to 14% of paediatric patients experiencing Laryngospasm.

Laryngospasm is a medical emergency and usually occurs as a result of an irritant in the airway, ie secretions, bleeding, ENT surgery or due to irritation from devices used for intubation. Laryngospasm obstructs the airway resulting in rapid O₂ desaturation and the patient becomes gravely hypoxemic.

This is therefore a critically important aspect of perioperative paediatric patient care and something we must always be alert to.

Anatomy & Physiology

Paediatric patients are not just little adults:



Children are anatomically quite different, their heads are much larger in proportion to their body.

When in the supine position, a young child's head will cause a natural flexion of the neck due to its larger size and this neck flexion can create a potential airway obstruction. Paediatric patients usually benefit from a towel to elevate the shoulders as well as someone to assist to help hold the head as it can be floppy.

A child's tongue is also proportionally larger than an adult's, and it may obstruct the airway due to its size.

A child's larynx is higher up (C2-C3) than in an adult, creating a more anterior location that often results in difficulty when attempting to visualize a child's airway.

The adult epiglottis is flat and flexible, while a child's is U-shaped, shorter and stiffer. This makes it more difficult to manipulate and is a common reason anaesthetists can't visualize an airway with a curved blade in a pediatric patient.

The pediatric patient's vocal cords slant upwards whereas in adults the vocal cords are horizontal. This concave shape may affect ventilation, and it's important for healthcare professionals to use a jaw-lift

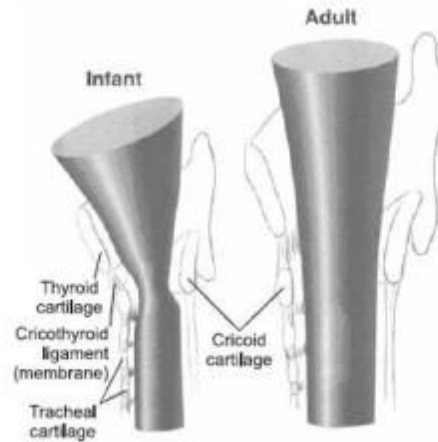
maneuver to open the airway.

The trachea is shorter in pediatric patients and a child's airway is narrowest at the cricoid ring. As a result secretions can easily obstruct the airway. Even a small amount of cricoid pressure can cause complete airway obstruction.

Smaller lung capacity in paediatric patients means that a child can become hypoxic more quickly than an adult. Ensure that oxygen saturation is monitored more closely and avoid prolonged periods without ventilation.

**Paediatric
Airways are
narrower and
therefore at a
much higher risk
of airway
obstruction.**

Figure 1. Comparison Of Infant And Adult Airway



From: Henretig, et al. Textbook of Pediatric Emergency Procedures

This comparison illustrates the significant differences in paediatric and adult airways and you can see how narrow the child's airway is at the cricoid ring.



Risk Factors for Laryngospasm

- Recent Upper Respiratory Tract Infection (URTI)
- Asthma
- Whooping Cough
- Second hand smoke
- Premature Birth
- GERD
- Irritation to the larynx from foreign objects, secretions, bleeding, ENT or other neck or esophageal procedures.
- Depth of Anaesthesia
- Inexperienced Anaesthesia Provider

There are many known risk factors for Laryngospasm. If a child undergoing surgery has a cold or experienced URTI symptoms within the last 30 days surgery is often delayed.

Any pre-existing airway pathologies must be taken into consideration to ensure closer monitoring and tailored anaesthesia utilising anaesthesia medications which are less irritating to the paed airway.

Depth of anaesthesia is the crucial time for Laryngospasm, with induction and emergence the most at-risk times for Laryngospasm to occur.

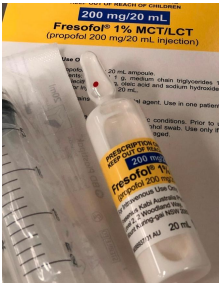


Identifying Laryngospasm

- The first sign of Laryngospasm will usually be audible stridor, however if the larynx is completely closed it will be silent.
- Respiratory rate will increase and paradoxical breathing will be evident
- Tracheal tug visible
- Oxygen saturation will drop RAPIDLY! (Remember also that the monitor measurement is delayed by 10-20 seconds)
- ETCO₂ (if monitored) will drop to nil or very low levels.
- Bradycardia
- Cyanosis

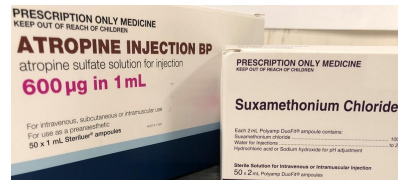
Remember that Paeds have much smaller lungs which means they have a much lower Functional Residual Capacity of air which will only last them a minute. In adults the FRC can last approximately 5 minutes. Paeds also metabolise oxygen at the twice the rate of adults, so cardiac arrest can happen within a minute.

Management & Treatment of Laryngospasm



- Follow DRABCDE Emergency Procedure, call for help.
- Position patient in supine position, perform jaw thrust & chin lift, remove any foreign objects and suction the oral cavity.
- Apply 100% (or highest setting O2) oxygen ventilation with CPAP or BVM equipped with PEEP valve.
- If desaturation is not halted administer Propofol IV to deepen anaesthesia, then administer Suxamethonium IV and Atropine IV. This will relax the vocal chords allowing them to re-open.

NOTE: Atropine must always be given with Sux. Sux causes Bradycardia and Atropine is essential to prevent cardiac arrest.



In our Recovery Room we have a paediatric emergency trolley so that also needs to be collected and our organisational emergency procedures followed. Once the vocal chords relax and larynx opens O2 saturation levels are rapidly restored. The anaesthetist may insert an airway and a breathing circuit with oxygen must continue. The paediatric patient will require close monitoring while emerging from anaesthesia. Fortunately the patient will have no recollection of the event.



Questions & Discussion



Question to Larnie (Marine Biologist) **Did you learn something from this presentation?**

"I learnt that the vocal chords look like a vagina!"

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